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Hugh G. Calkins
Regional Conservator

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VOLUME TABLES FOR JUNIPERUS MONOSPERMA AND JUNIPERUS SCOPULORUM

By

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INTRODUCTION

One-seed juniper (Juniperus monosperma (Engelm.) Sarg.) and Rocky Mountain Red Cedar (Juniperus scopulorum, Sarg.) have been of inestimable value in the development of the Southwest. The wood of these two trees is used for fuel, fence posts, poles, and miscellaneous construction materials. Furthermore, these junipers are highly important as watershed cover, especially on steep, stony slopes where the vegetation is otherwise scanty.

The one-seed juniper is a many-branched tree with a sprawling habit of growth, although occasionally it forms single stemmed trees of fair proportions, whereas Rocky Mountain red cedar is more inclined to form a single stem with little forking. Because of this variable growth habit, the variation in the quantity of wood products is large, and furthermore it is not always possible to use, or even secure, the measurements usually associated with volume.

MEASUREMENTS

Sample trees were taken throughout the coniferous woodland stands of the Upper Rio Grande Valley, New Mexico and on parts of the Navajo Indian Reservation in New Mexico and Arizona. Each tree was felled and then measured with a steel tape as follows: (1) Diameter at one foot above the average ground level; (2) Diameter Breast Height; (3) Total Height, vertical to highest point of tree; (4) Crown Length, to lowest green branch; (5) Average Crown Width, average of two diametrically opposite measurements; and (6) Number of 7 foot-5 inch top fence posts. After measuring, the tree was cut up into four foot pieces and those pieces measuring two inches or more at the middle outside bark were recorded. Besides the middle diameter, the diameter at the small end and average bark thickness were recorded. These sticks were stacked and then measured for stacked cubic volume and cord volume. The brush was piled compactly and measured for cubic contents.

The solid volume of each stick was determined by computation, Huber's formula. Each stick was assumed to be a cylinder four feet long, having a diameter equal to the diameter at the middle of each stick, outside the bark. The standard cord of 128 cubic feet was used in computing cord volume.

ANALYSIS

The methods of statistical analysis proposed by Bruce and Schumacher** and Snedecor*** were followed. The method of least squares was used to

* This work was performed under a cooperative agreement between the Soil Conservation Service and the Forest Service.

** Bruce, D. and Schumacher, F. X. Forest Mensuration. 360 pp. 1934.

*** Snedecor, G. W. Statistical Methods. 341 pp. 1937.

compute regression equations and other statistics. The alinement charts were prepared by standard methods. However, the aggregate errors by these methods were so great that it was necessary to resort to graphic methods in order to secure the desired degree of accuracy. The alinement charts were corrected until an aggregate deviation of two percent or less was secured. Also, all tables having an average percentage deviation of over 60 percent were discarded. The values in the tables were taken from the alinement chart and then plotted on coordinate paper as a means of detecting errors in reading.

ROCKY MOUNTAIN RED CEDAR

1. Volume table based on diameter at one foot and average crown width.

This is a new departure in the preparation of volume tables, but it has been found to be the best measure for determining volume in cubic feet of all sticks four feet long and two inches or over in diameter outside bark for the types of trees studied.

2. Volume table based on diameter breast height and total height.

This table is based upon the usual diameter breast height and total height measurements, and is satisfactory for field use. Because of the bushy habit of some of the trees, total height fails to have much influence in determining volume.

3. Volume table based on diameter at breast height and crown width.

This table departs from the usual table in that average crown width was substituted for total height. There is but little difference between this and the foregoing table; the most easily taken pair of measurements should decide the table to be used.

4. Volume table based on total height and diameter at one foot.

In this table, diameter at one foot was used instead of diameter breast height. This measurement can be as readily taken as the D.B.H. measurement. In this instance, such combination of independent variables did not improve the estimation of volume as much as is desirable because of the negative sign of the coefficient for total height. Furthermore, the height axis folds back upon itself, indicating that the trees above 25 feet in height have a disproportionate increase in the number of pieces and thus have a greater volume.

5. Volume tables for stacked cubic volume and cord volume based on diameter breast height and crown width.

These tables may be substituted for the volume tables based on partial cubic volume. They permit the conversion to cords or stacked volume without the use of conversion factors. The standard cord containing 128 cu. ft. was used. Here again average crown width is used instead of total height.

The cord volume table is a direct conversion of the stacked cubic volume table. The alinement chart contains both stacked cubic volume and cord volume.

ONE-SEED JUNIPER

This juniper has a much more variable form than the Rocky Mountain red cedar and, as a result, the average percentage deviations are higher; however, it is believed that they are sufficiently low to give satisfactory tables for the species.

1. Volume table based on diameter at one foot and crown width.

This combination of measurements gave the best results in an intensive study of the "Relation of Crown Diameter to Cubic Volume of One-Seed Juniper," Journal of Forestry, XXXV:9:829-831, 1937, and again gave the best results for the species. These two measurements are readily taken, although it is possible that those not accustomed to taking these measurements will have some difficulty at first.

2. Volume table based on diameter breast height and crown width.

This table has diameter breast height substituted for the diameter at one foot and gives a table essentially as good as the one above. The table most suitable to the work should be used.

3. Volume table for brush based on crown width and crown length.

The brush of one-seed juniper has been extensively used in soil and water conservation work to good advantage. This table has been prepared as an aid in determining the quantity of brush that can be removed from the stand. The table is for total brush and so must be reduced by a proper factor, usually to 1/5, to determine actual quantity to remove under the concealed cutting method.

The independent variable, crown width and crown length, was selected by inspection, as possibly being more closely associated with total brush volume than any other factor or pair of factors.

CONVERSION FACTORS FOR DETERMINING CORD VOLUMES

Rocky Mountain Red Cedar

During the course of the study 101 trees of Rocky Mountain red cedar were cut and the contents stacked. These trees yielded 8.61 standard cords or 0.085 cords per tree. One standard cord was found to contain an average of 64.24 solid cubic feet, or there was 50.2% solid wood in the cord.

One-Seed Juniper

Of this species, 574 trees were felled and stacked, yielding 70.96 standard cords, or an average of 0.124 cords per tree. One standard cord was found to contain an average of 63.30 cubic feet, solid, or 49.8% of the stacked volume was solid wood.

CONCLUSION

The tables presented here are to be considered satisfactory for field use in the Southwest for the coniferous woodland type. Because of the variability exhibited by cubic volume, these tables should be checked for local use and such corrections made as are deemed necessary. Further tables will be prepared in an endeavor to increase the accuracy of the volume estimate.

ROCKY MOUNTAIN RED CEDAR
(*Juniperus scopulorum* (Sarg.))

PARTIAL VOLUME IN CUBIC FEET BASED ON DIAMETER
IN INCHES AT ONE FOOT AND CROWN WIDTH IN FEET

Arizona - New Mexico
1938

Partial Contents
with Bark
Cubic Feet

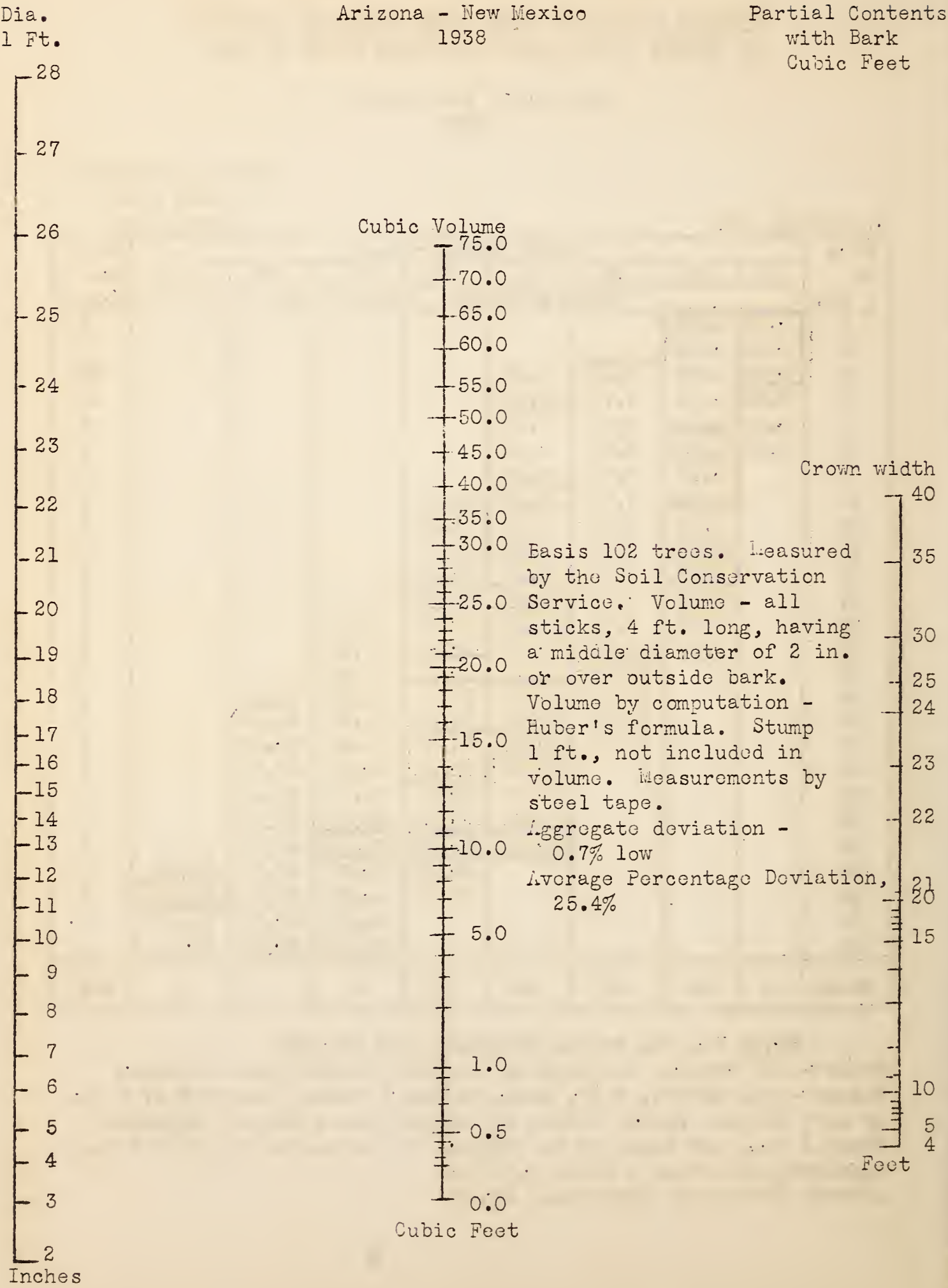
J. Howell, Jr.

Dia. at 1 ft.	Crown Width - Feet								Basis No. of Trees
	5	10	15	20	25	30	35	40	
	Partial Volume - Cubic Feet								
3	0.10	0.30							8
4	0.29	0.53							6
5	0.51	0.65	1.35	1.45					16
6	0.68	0.78	1.70	2.20					15
7	0.78	0.94	2.20	2.80					5
8	0.94	1.16	2.90	3.60					8
9		1.43	3.85	4.70					8
10		1.80	4.75	5.70	11.00				3
11		2.25	5.65	6.70	11.75				4
12		2.75	6.50	7.60	12.40				3
13		3.37	7.40	8.48	13.00				4
14		4.03	8.22	9.40	13.75	15.40			7
15		4.60	9.03	10.25	14.40	16.20			2
16		5.50	9.98	11.00	15.15	17.25			3
17			10.85	11.80	16.00	18.35			3
18			11.70	12.55	17.00	19.75	22.50		0
19			12.65	13.40	18.30	21.20	24.40		0
20			13.55	14.50	20.50	23.40	26.20		2
21				15.90	22.50	25.50	28.60		1
22				17.50	24.80	28.00	31.40		0
23				19.95	27.20	30.80	36.80		0
24				23.40	30.00	35.40	42.20	47.00	3
25					35.60	41.70	47.50	56.90	0
26					43.00	48.30	53.60	60.50	1
27						54.40	59.70	64.40	0
28						59.90	65.20	69.80	0
Basis	6	38	34	12	10	1	0	1	102

64.24 cu. ft. to one standard cord (50.2%)

Basis - 102 trees. Measured by the Soil Conservation Service.
Volume - all sticks, 4 ft. long, having a middle diameter of 2 in.
or more outside bark. Volume by computation - Huber's formula.
Stump 1 ft., not included in volume. Measurements by steel tape.
Aggregate Deviation - Table 0.7% low
Average Percentage Deviation, 25.4%

PARTIAL VOLUME IN CUBIC FEET BASED ON DIAMETER
IN INCHES AT ONE FOOT AND CROWN WIDTH IN FEET



ROCKY MOUNTAIN RED CEDAR
(*Juniperus scopulorum* (Sarg.))

PARTIAL VOLUME IN CUBIC FEET BASED ON DIAMETER
BREAST HEIGHT IN INCHES AND TOTAL HEIGHT IN FEET

Arizona - New Mexico
1938

Partial Contents
with Bark
Cubic Feet

J. Howell, Jr.

D.B.H. Inches	Total Height - Feet					Basis No. of Trees
	10	15	20	25	30	
	Partial Volume - Cubic Feet					
2	0.14	0.15	0.18			8
3	0.48	0.50	0.53			14
4	0.80	0.81	0.82	0.85		21
5	1.25	1.30	1.40	1.50	1.55	12
6	2.28	2.38	2.50	2.60	2.70	10
7	3.46	3.58	3.64	3.80	4.00	9
8	4.90	5.00	5.10	5.15	5.34	5
9	6.40	6.25	6.45	6.60	6.75	9
10	7.78	8.00	8.15	8.30	8.42	4
11		9.72	9.90	10.00	10.34	5
12		11.78	11.90	12.00	12.20	1
13		13.80	14.00	14.10	14.82	5
14		15.75	16.00	16.10	16.20	1
15			18.40	18.80	19.00	2
16			20.30	20.70	21.00	5
17			22.60	22.80	23.00	1
18			25.00	25.20	25.70	1
19				27.70	26.50	0
20					28.10	0
Basis	10	45	40	16	2	113

64.24 cu. ft. to one standard cord (50.2%)

Basis - 113 trees. Measured by the Soil Conservation Service.

Volume - all sticks, 4 ft. long, having a middle diameter of 2 in. or more outside bark. Volumes by computation - Huber's formula.

Stump 1.0 ft., not included in volume. Measurements by steel tape.

Aggregate Deviation - Table 2.0% low

Average Percentage Deviation, 34.3%

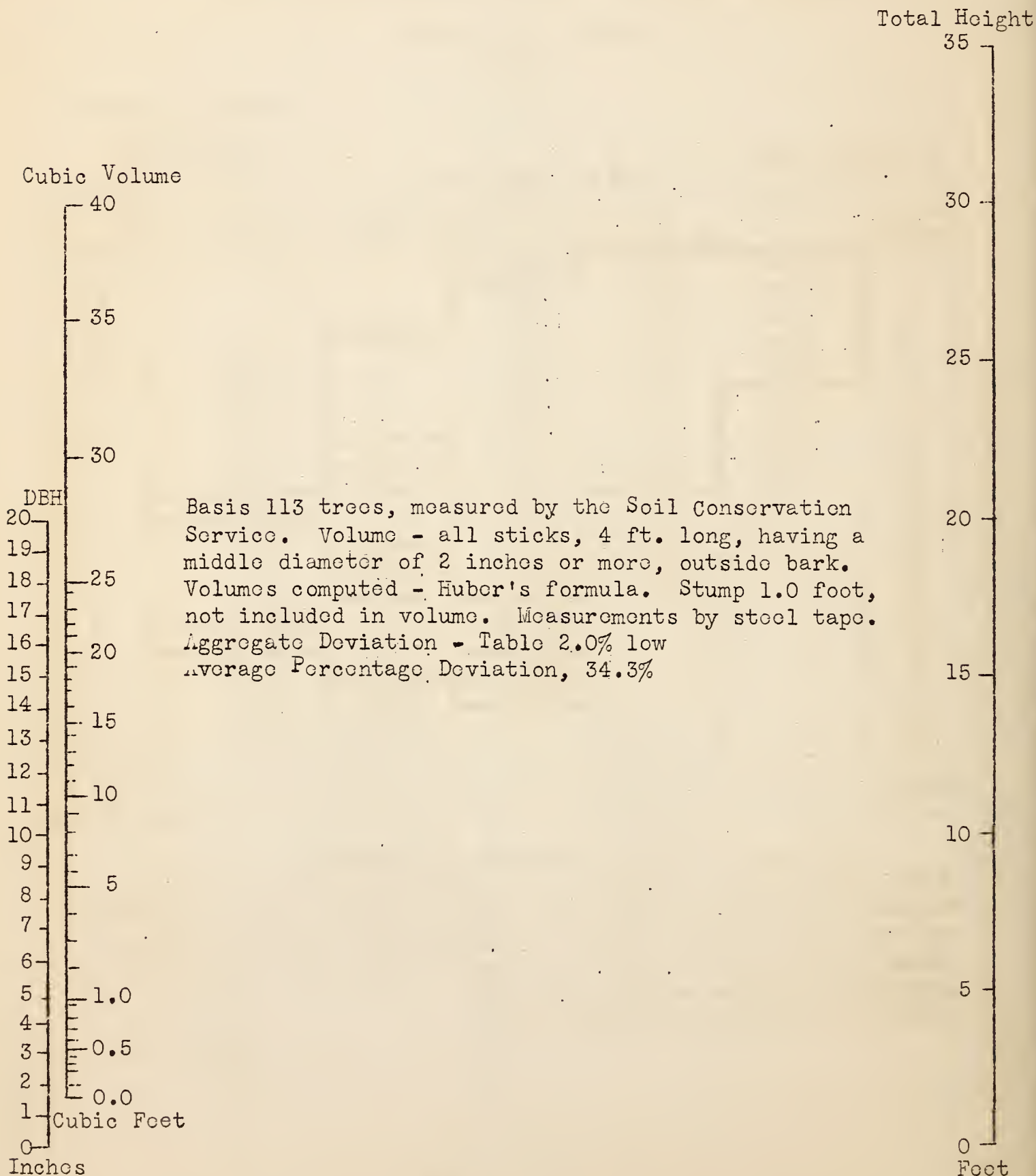
J. Howell, Jr.

JUNIPERUS SCOPULORUM
(Rocky Mt. Red Cedar)

PARTIAL VOLUME IN CUBIC FEET BASED ON DIAMETER
BREAST HEIGHT IN INCHES AND TOTAL HEIGHT IN FEET

Arizona - New Mexico
1938

Partial Contents
with Bark
Cubic Feet



ROCKY MOUNTAIN RED CEDAR
(*Juniperus scopulorum* (Sarg.))

PARTIAL VOLUME IN CUBIC FEET BASED ON DIAMETER
BREAST HEIGHT IN INCHES AND CROWN WIDTH IN FEET

Arizona - New Mexico
1939

Partial Volume with Bark Cubic Feet									
J. Howell, Jr.	Crown Width - Feet								Basis
D.B.H. Inches	5	10	15	20	25	30	35	40	No. of Trees
Cubic Volume - Cubic Feet									
2	0.10	0.18	0.35						8
3	0.35	0.48	0.70	1.02					13
4	0.70	0.86	1.20	1.60					20
5	1.23	1.45	1.93	2.40					11
6	1.80	2.08	2.68	3.28	3.92				9
7		3.08	3.67	4.40	5.17				7
8		4.10	4.79	5.63	6.40	7.22			5
9		5.32	5.95	6.80	7.70	8.55			7
10		6.50	7.25	8.12	8.98	9.90	10.92		3
11		7.80	8.73	9.68	10.72	11.84	13.00		4
12		9.25	10.28	11.30	12.65	13.82	15.00	16.65	1
13			12.00	13.28	14.50	15.91	17.16	18.80	1
14			13.90	15.20	16.64	18.00	19.80	23.10	1
15			15.92	17.17	18.88	20.70	25.22	36.15	2
16			18.28	20.00	23.17	29.40	43.10	67.80	4
17				25.80	33.12	49.50	60.50	76.95	1
18					55.00	67.35	79.10	95.00	1
Basis	6	38	34	13	7	3	0	1	102

64.24 cu. ft. to one standard cord (50.2%)

Basis - 102 trees. Measured by the Soil Conservation Service.
All sticks, 4 ft. long, having a middle diameter of 2 in. or more
outside bark. Volume by computation - Huber's formula. Stump
1 ft., not included in volume. Measurements by steel tape.
Aggregate Deviation - Table 0.7% high
Average Percentage Deviation, 35.3%

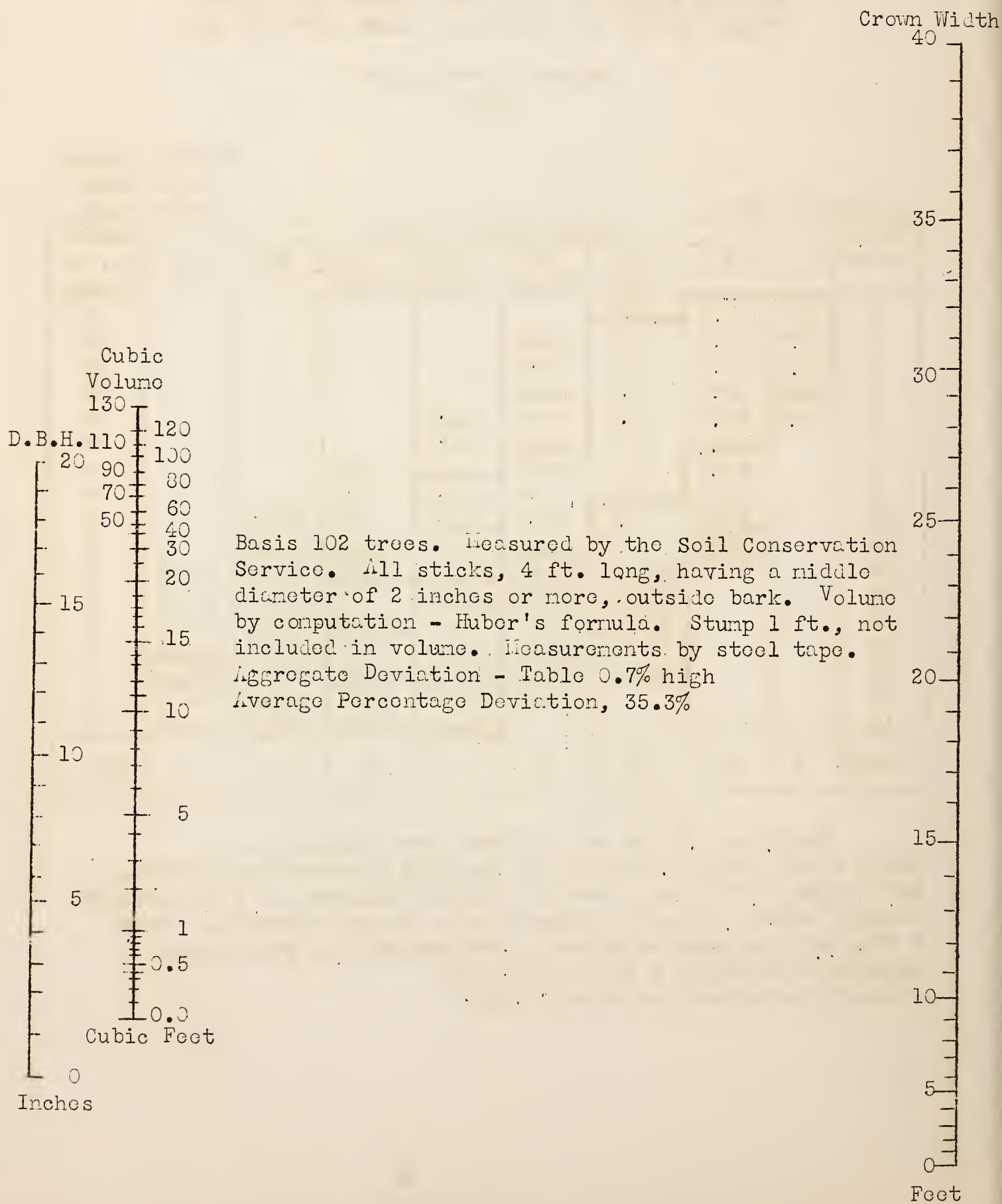
J. Howell, Jr.

JUNIPERUS SCOPULORUM
(Rocky Mt. Red Cedar)

PARTIAL VOLUME IN CUBIC FEET BASED ON DIAMETER
BREAST HEIGHT IN INCHES AND CROWN WIDTH IN FEET

Arizona - New Mexico
1939

Partial Volume
with Bark
Cubic Feet



ROCKY MOUNTAIN RED CEDAR
(*Juniperus scopulorum* (Sarg.))

PARTIAL VOLUME IN CUBIC FEET BASED ON DIAMETER
IN INCHES AT ONE FOOT AND TOTAL HEIGHT IN FEET

Arizona - New Mexico
1939

Partial Contents
with Bark
Cubic Feet

J. Howell, Jr.

Dia. 1 ft. Inches	Total Height - Feet							Basis No. of Trees
	10	15	20	25	30	35	40	
	Partial Volume - Cubic Feet							
3	0.39	0.09						8
4	0.78	0.37	0.16	0.10				18
5	1.17	0.75	0.50	0.40				30
6	1.74	1.22	0.90	0.86	1.00	1.30		43
7	2.50	1.70	1.37	1.27	1.44	1.78		20
8	3.90	2.45	1.88	1.78	2.00	2.65		19
9	5.30	4.23	3.20	3.00	3.50	4.30		31
10	7.18	5.72	5.00	4.85	5.13	5.80	7.28	19
11		7.45	6.50	6.42	7.00	7.60	9.50	27
12		9.00	8.00	7.88	8.28	9.22	11.40	14
13		11.00	9.45	9.20	9.82	11.38	14.55	11
14		12.82	11.12	11.00	11.78	13.13	16.00	19
15		15.00	13.00	12.62	13.20	15.20	17.90	6
16		16.95	15.00	14.78	15.63	17.00	20.40	8
17		19.00	17.00	16.80	17.57	19.48	24.00	6
18		21.30	18.58	18.40	19.40	22.00	27.20	2
19			20.60	20.40	21.50	24.70	30.58	0
20			23.50	23.30	24.50	28.40	35.00	2
21			26.55	25.75	27.65	31.50	38.22	1
22			30.20	29.90	31.08	35.15	41.35	1
23			33.20	32.90	35.10	40.00	45.00	0
24			37.83	37.40	38.72	42.62	48.20	3
25				40.50	42.00	45.68	51.20	0
26				43.50	44.90	48.72	54.40	1
27						51.50	57.20	0
28							60.00	0
Basis	20	89	68	56	30	22	4	289

64.24 cu. ft. to one standard cord (50.2%)

Basis - 289 trees. Measured by the Soil Conservation Service.
Volume- all sticks, 4 ft. long, having a middle diameter of 2 in.
or more, outside bark. Volumes by computation - Huber's formula.
Stump 1.0 ft., not included in volume. Measurements by steel tape.
Aggregate Deviation - Table 0.2% high
Average Percentage Deviation, 52.8%

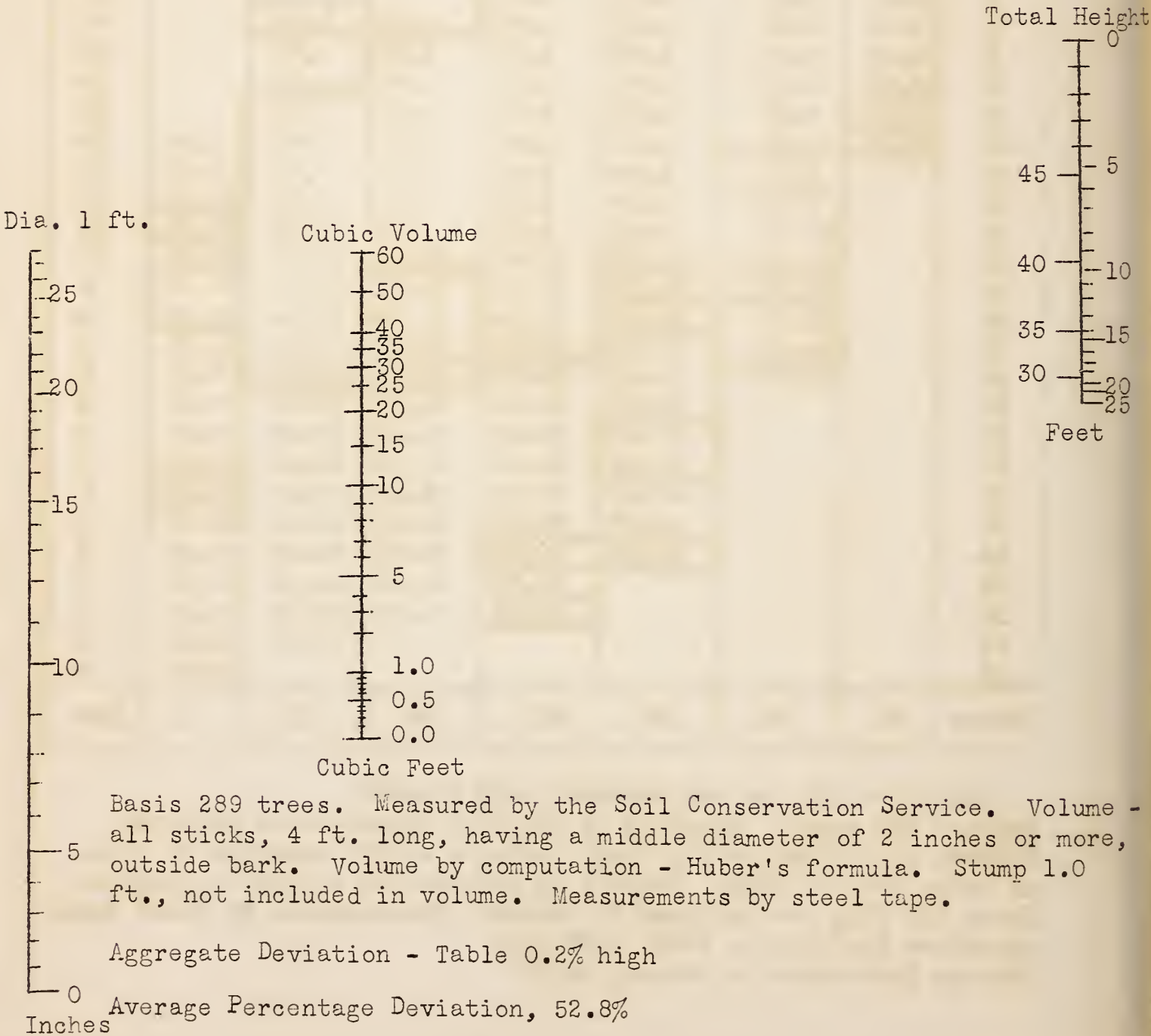
J. Howell, Jr.

JUNIPERUS SCOPULORUM
(Rocky Mt. Red Cedar)

PARTIAL VOLUME IN CUBIC FEET BASED ON DIAMETER
IN INCHES AT ONE FOOT AND TOTAL HEIGHT IN FEET

Arizona - New Mexico
1939

Partial Contents
with Bark
Cubic Feet



ROCKY MOUNTAIN RED CEDAR
(*Juniperus scopulorum* (Sarg.))

STACKED VOLUME IN CUBIC FEET BASED ON DIAMETER
BREAST HEIGHT IN INCHES AND CROWN WIDTH IN FEET

Arizona - New Mexico
1939

Stacked Volume With Bark Cubic Feet									Basis No. of Trees
D.B.H. Inches	Crown Width - Feet								
	5	10	15	20	25	30	35	40	
Stacked Volume - Cubic Feet									
2	0.05	0.13	0.40						8
3	0.48	0.80	1.17	1.45					13
4	1.23	1.52	1.80	2.10					20
5	1.86	2.20	2.78	3.52					11
6	2.85	3.58	4.45	5.58	7.32				9
7		6.00	7.60	9.50	11.60				7
8		10.00	12.00	13.68	15.35	16.85			5
9		14.00	15.55	16.83	18.22	19.45			7
10		17.12	18.42	19.70	20.75	21.80	22.90		3
11		20.00	21.05	22.18	23.10	24.00	25.00		4
12		22.30	23.22	24.16	26.75	26.94	30.00	32.80	1
13			25.53	28.25	30.00	32.88	35.30	37.83	1
14		30.90	33.50	35.80	38.32	41.00	45.10	1	
15		36.00	39.30	42.50	47.50	52.30	57.00	2	
16		43.18	48.22	53.30	58.56	66.60	72.50	4	
17			60.00	67.80	75.00	84.20	93.20	1	
18				86.40	94.50	102.10	110.00	1	
Basis	6	38	34	13	7	3	0	1	102

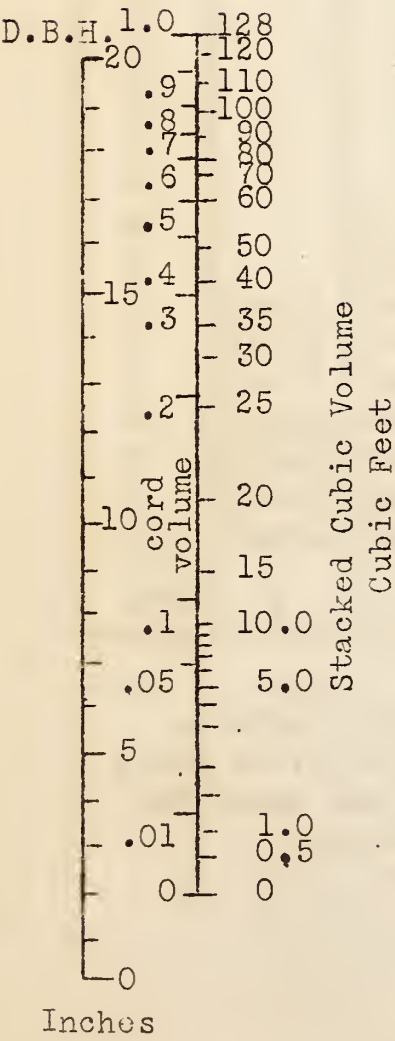
Basis - 102 trees. Measured by the Soil Conservation Service.
All sticks 4 ft. long, having a middle diameter of 2 in. or more,
outside bark. Volume by stacking in regular ricks and computing
contents. Cord wood only. Measurements by steel tape.
Aggregate Deviation - Table 0.6% low.
Average Percentage Deviation, 35.9%

STACKED VOLUME IN CUBIC FEET BASED ON DIAMETER BREAST HEIGHT IN INCHES AND
CROWN WIDTH IN FEET. PARTIAL VOLUME IN STANDARD CORDS BASED ON DIAMETER
BREAST HEIGHT IN INCHES AND CROWN WIDTH IN FEET

Arizona - New Mexico
1939

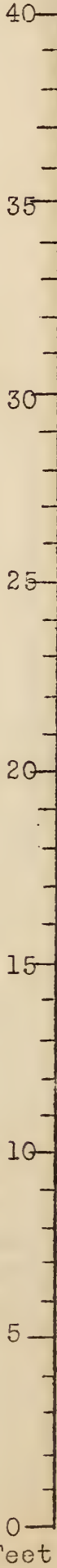
Crown
Width

Stacked volume
Cord volume
with bark.
Cubic Feet
Standard Cords



Basis 102 trees. Measured by the Soil Conservation Service. All sticks 4 ft. long, having a middle diameter of 2 inches or more, outside bark. Stacked cubic volume by stacking in regular ricks and computing contents. Cord volume by converting stacked cubic volume. Measurements by steel tape.

Aggregate Deviation - Table 0.6% low
Average Percentage Deviation, 35.9%



ROCKY MOUNTAIN RED CEDAR
(*Juniperus scopulorum* (Sarg.))

PARTIAL VOLUME IN STANDARD CORDS BASED ON DIAMETER
BREAST HEIGHT IN INCHES AND CROWN WIDTH IN FEET

Arizona - New Mexico
1939

Cord Volume with Bark Standard Cord									
J. Howell, Jr.									
D.B.H. Inches	Crown Width - Feet								Basis
	5	10	15	20	25	30	35	40	No.of Trees
	Cord Measure								
2	0.0004	0.0010	0.0031						8
3	0.0038	0.0063	0.0091	0.0113					13
4	0.0096	0.0119	0.0141	0.0264					20
5	0.0145	0.0172	0.0217	0.0275					11
6	0.0223	0.0280	0.0348	0.0436	0.0572				9
7		0.0469	0.0594	0.0742	0.0906				7
8		0.0781	0.0938	0.1069	0.1199	0.1316			5
9		0.1094	0.1215	0.1315	0.1423	0.1520			7
10		0.1338	0.1439	0.1539	0.1621	0.1703	0.1789		3
11		0.1563	0.1645	0.1733	0.1805	0.1875	0.1953		4
12		0.1742	0.1814	0.1888	0.2090	0.2105	0.2344	0.2563	1
13			0.1995	0.2207	0.2344	0.2569	0.2758	0.2955	1
14			0.2414	0.2617	0.2734	0.2994	0.3203	0.3523	1
15			0.2813	0.3070	0.3320	0.3711	0.4086	0.4453	2
16			0.3373	0.3767	0.4164	0.4575	0.5203	0.5664	4
17				0.4688	0.5297	0.5859	0.6578	0.7281	1
18					0.6750	0.7383	0.7976	0.8594	1
Basis	6	38	34	13	7	3	0	1	102

1 standard cord = 64.24 cu. ft. (50.2%)

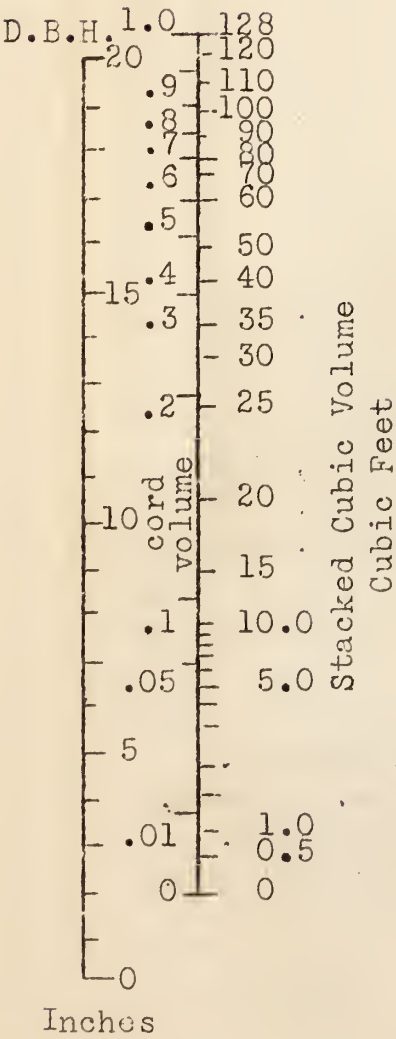
Basis - 102 trees. Measured by the Soil Conservation Service.
All sticks 4 ft. long, having a middle diameter of 2 in. or more,
outside bark. Volume by conversion from stacked cubic volume.
Cubic volume by stacking in regular ricks and computing contents.
Measurements by steel tape.
Aggregate Deviation - Table 0.6% low.
Average Percentage Deviation, 35.9%.

STACKED VOLUME IN CUBIC FEET BASED ON DIAMETER BREAST HEIGHT IN INCHES AND CROWN WIDTH IN FEET. PARTIAL VOLUME IN STANDARD CORDS BASED ON DIAMETER BREAST HEIGHT IN INCHES AND CROWN WIDTH IN FEET

Arizona - New Mexico
1939

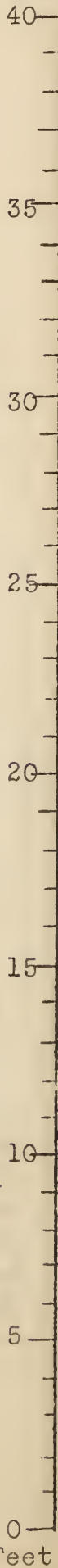
Stacked volume
Cord volume
with bark.
Cubic Feet
Standard Cords

Crown
Width



Basis 102 trees. Measured by the Soil Conservation Service. All sticks 4 ft. long, having a middle diameter of 2 inches or more, outside bark. Stacked cubic volume by stacking in regular ricks and computing contents. Cord volume by converting stacked cubic volume. Measurements by steel tape.

Aggregate Deviation - Table 0.6% low
Average Percentage Deviation, 35.9%



ONE-SEED JUNIPER
(Juniperus monosperma (Engelm) Sarg.)

PARTIAL VOLUME IN CUBIC FEET BASED ON DIAMETER IN
INCHES AT ONE FOOT AND CROWN DIAMETER IN FEET

Arizona - New Mexico
1938

Partial Contents
with Bark
Cubic Feet

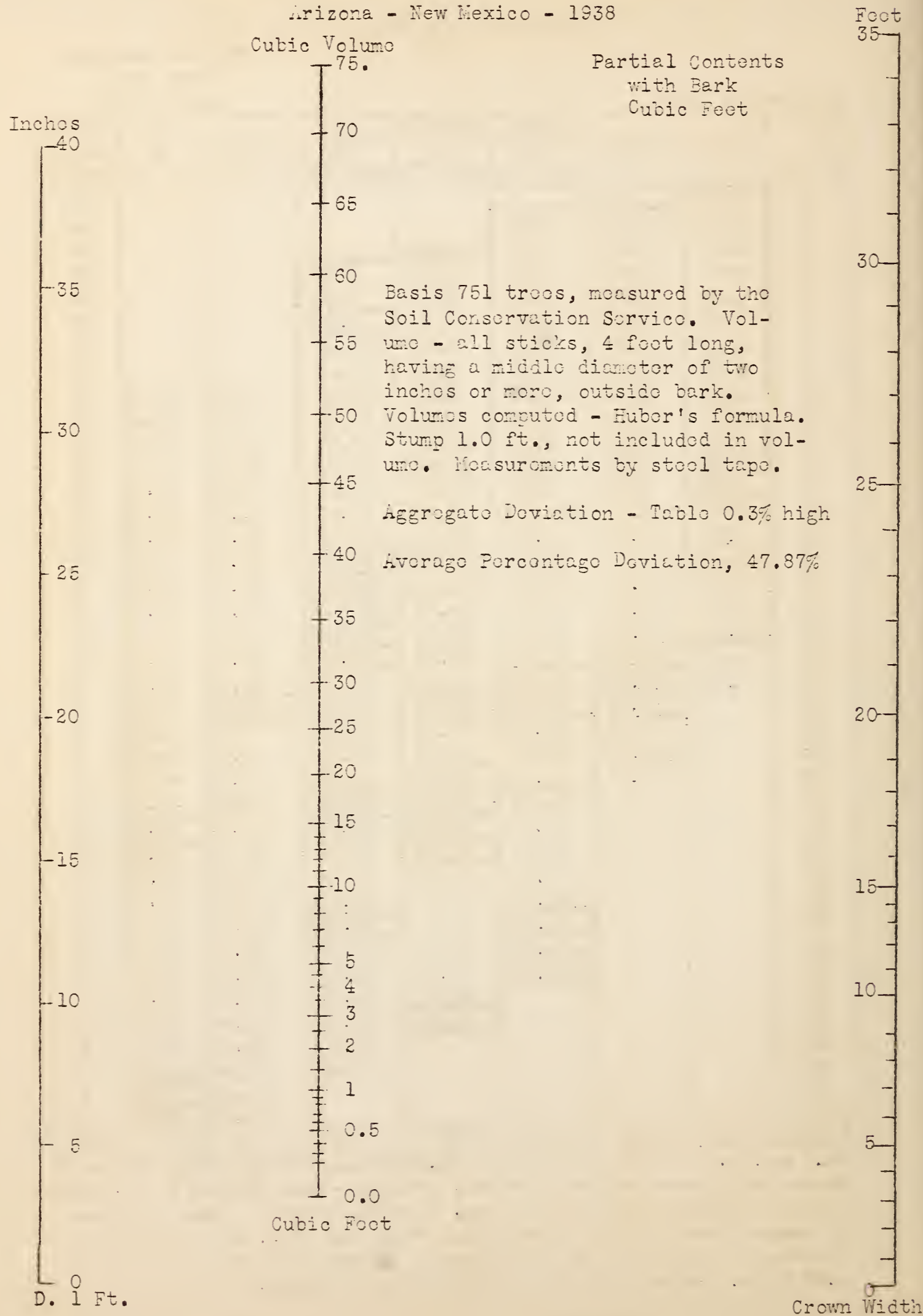
J. Howell, Jr.

Dia. at 1 Ft.	Crown Diameter - Feet							Basis No. of Trees
	5	10	15	20	25	30	35	
	Cubic Volume - Cubic Feet							
2	0.14							1
3	0.16	0.46	0.82					24
4	0.22	0.64	1.10	2.58				46
5	0.37	0.92	1.62	3.20	6.20			56
6	0.55	1.28	2.15	3.90	7.65			74
7	0.76	1.75	2.70	4.70	9.00			59
8	1.10	2.26	3.30	5.70	10.55			76
9	1.51	2.80	4.02	6.80	12.10			78
10	1.98	3.45	4.95	8.05	13.90	21.30	29.20	60
11	2.47	4.20	6.00	9.50	15.60	23.20	31.00	45
12	3.10	5.05	7.10	11.00	17.30	25.50	32.60	45
13	3.75	6.05	8.35	12.55	19.45	27.60	34.20	32
14	4.62	7.30	9.75	14.30	21.35	29.70	35.90	36
15	5.60	8.65	11.25	15.95	23.40	31.80	37.05	30
16	6.70	10.05	13.00	17.90	25.75	33.40	38.90	22
17	7.95	11.70	14.70	19.90	27.90	34.90	40.00	12
18	9.20	13.20	16.30	21.90	30.00	36.25	41.70	7
19	10.80	15.00	18.25	24.10	32.00	37.55	42.70	6
20	12.45	16.90	20.25	26.15	33.50	39.15	44.45	10
21	14.05	18.90	22.30	28.55	35.00	40.45	46.10	3
22	15.70	20.80	24.65	30.80	36.50	42.25	47.00	5
23		23.10	26.90	32.50	37.95	43.75	48.75	5
24		25.05	29.00	34.05	39.50	44.55	49.80	3
25		26.00	31.00	35.45	40.50	46.30	51.25	4
26		30.00	33.00	36.95	42.10	48.00	52.55	1
27			34.30	38.20	43.65	48.75	54.00	3
28			35.60	39.65	44.85	50.15	55.25	1
29			37.50	40.95	46.25	51.45	56.65	1
30			38.90	42.40	47.70	52.85	58.10	0
31			40.00	44.20	48.90	54.30	59.45	0
32			42.00	46.00	50.00	55.70	60.95	2
33			42.80	47.00	51.80	57.00	62.35	0
34			44.00	48.25	53.15	58.55	63.65	2
35				49.30	54.55	59.85	65.00	0
36				50.80	55.85	61.00	66.35	1
37					57.30	62.65	67.70	0
38					58.55	63.95	68.15	0
39						65.35	70.50	1
40						66.75	71.80	0
Basis	100	326	221	68	31	3	2	751

63.7 cu.ft. to 1 standard cord (49.8%) Basis - 751 trees, measured by the Soil Conservation Service. Volume - all sticks, 4 ft. long, having a middle diameter of 2 in. or more, outside bark. Volumes by computation - Huber's formula. Stump 1.0 ft., not included in volume. Measurements by steel tape. Aggregate Deviation - Table 0.3% high. Average Percentage Deviation, 47.87%.

PARTIAL VOLUME IN CUBIC FEET BASED ON DIAMETER IN
INCHES AT ONE FOOT AND CROWN DIAMETER IN FEET

Arizona - New Mexico - 1938



ONE-SEED JUNIPER
(*Juniperus monosperma* (Engelm) Sarg.)

PARTIAL VOLUME IN CUBIC FEET BASED ON DIAMETER
BREAST HEIGHT IN INCHES AND CROWN WIDTH IN FEET

Arizona - New Mexico
1938

J. Howell, Jr.

Partial Contents
with Bark
Cubic Feet

D.B.H. Inches	Crown Width - Feet							Basis No. of Trees
	5	10	15	20	25	30	35	
Partial Volume - Cubic Feet								
1	0.60	1.00	2.25					9
2	0.71	1.40	2.88					45
3	1.00	1.85	3.52	6.70				70
4	1.45	2.35	4.30	7.90				80
5	1.82	2.90	5.10	9.15	17.10			63
6	2.30	3.47	5.90	10.40	18.80			62
7	2.70	4.00	6.80	11.60	20.60	35.25		50
8	3.10	4.62	7.65	12.80	22.60	36.90		56
9	3.50	5.20	8.40	14.00	24.75	38.70	55.00	43
10	3.92	5.78	9.20	15.25	26.20	40.00	56.50	22
11	4.40	6.35	10.00	16.50	28.00	41.30	57.20	22
12	4.82	6.90	10.60	17.80	30.00	43.40	59.00	16
13	5.30	7.50	11.60	19.00	31.40	45.00	60.00	13
14	5.70	8.10	12.60	20.00	32.70	46.30	61.60	7
15		8.70	13.60	21.15	34.15	48.25	62.60	7
16		9.30	14.60	22.65	35.50	50.00	64.10	5
17		9.90	15.60	24.10	36.30	50.60	65.00	2
18		10.25	16.60	25.00	37.70	51.90	66.40	5
19			17.35	26.90	38.70	53.20	67.40	2
20			18.35	28.00	40.00	54.30	68.70	1
21			19.30	30.00	41.30	55.50	70.00	0
22			20.40	30.60	42.40	56.50	71.10	1
23				31.70	43.75	57.80	72.00	0
24				33.30	45.15	59.00	72.80	1
25					46.30	60.00	73.80	0
26					47.50	60.50	74.60	0
27						61.60	75.20	0
28						62.70	76.10	0
29							77.20	0
30							78.10	1
Basis	71	250	176	56	25	2	3	583

63.7 cu. ft. to 1 standard cord. (49.8%)

Basis - 583 trees. Measured by the Soil Conservation Service.
Volume - all sticks, 4 ft. long, having a middle diameter of 2 in.
or more outside bark. Volume by computation - Huber's formula.
Stump 1.0 ft. not included in volume. Measurements by steel tape.
Aggregate Deviation - 0.3% high.
Average Percentage Deviation, 50.3%

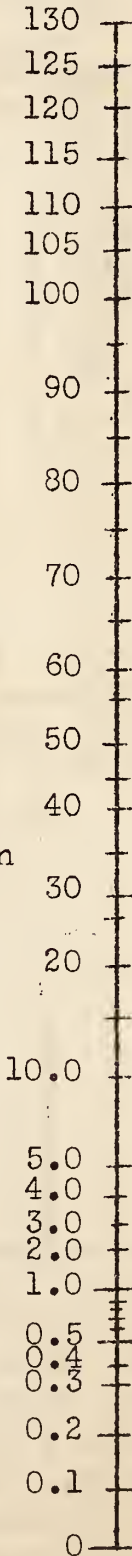
PARTIAL VOLUME IN CUBIC FEET BASED ON DIAMETER
BREAST HEIGHT IN INCHES AND CROWN WIDTH IN FEET

Arizona - New Mexico
1938

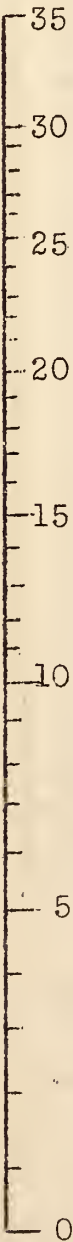
Crown width
50

Partial contents
with bark
Cubic feet

Cubic Volume



D.B.H.



Basis 583 trees. Measured by the Soil
Conservation Service. Volume - all
sticks, 4 foot long, having a middle
diameter of 2 inches or more outside
bark. Volume by computation - Huber's
formula. Stump 1 foot, not included in
volume. Measurements by steel tape.

Aggreage Deviation - Table 0.3% high
Average Percentage Deviation, 50.3%

Inches

Cubic
Foot

ONE-SEED JUNIPER
(*Juniperus monosperma*, (Engelm) Sarg.)

TOTAL VOLUME OF BRUSH IN CUBIC FEET BASED ON
CROWN WIDTH IN FEET AND CROWN LENGTH IN FEET

Arizona - New Mexico
1939

J. Howell, Jr.

Total Volume
of Brush

Crown Width Feet	Crown Length - Feet							Basis No. of Trees
	5	10	15	20	25	30	35	
	Total Volume of Brush - Cubic Feet							
6	2.5	5.6	11.8	17.5				48
8	11.3	15.3	23.5	33.0	40.0			-
10	20.6	25.8	38.8	52.0	64.5			169
12	31.0	39.0	57.0	76.0	90.0			-
14	42.1	51.3	75.0	90.0	96.7	100.0		-
16	56.5	72.3	90.0	100.0	106.5	115.0	126.0	132
18	84.0	92.0	110.0	117.7	128.5	140.0	152.0	-
20	102.6	112.5	134.0	153.5	178.0	205.0	248.0	42
22		134.0	166.0	200.0	232.5	257.0	324.0	-
24		150.0	200.0	237.8	272.0	315.0	380.0	20
26		170.0	230.0	272.5	322.0	370.0	440.0	-
28			263.0	320.0	384.0	440.0	500.0	-
30			297.0	365.0	450.0	505.0	555.0	1
32			350.0	460.0	537.5	590.0	618.0	-
34			420.0	532.0	600.0	652.0	700.0	1
36			480.0	600.0	660.0	722.0	760.0	1
38				637.0	715.0	750.0	812.0	-
40				690.0	750.0	812.0	870.0	-
42					850.0	900.0	948.0	-
44					940.0	995.0	1050.0	-
46					1064.0	1125.0	1160.0	-
48						1225.0	1250.0	-
50						1302.0	1350.0	-
52						1425.0	1480.0	-
54						1550.0	1610.0	-
56						1712.0	1760.0	1
58							1950.0	-
60							2015.0	-
Basis	12	151	173	58	13	6	2	415

Basis - 415 trees. Measured by the Soil Conservation Service.
Total volume of brush removed from trees. Measurements with steel
tape. Volume by computation. Brush stacked in
piles for measurement.

Aggregate Deviation - Table 1.7% high.

Average Percentage Deviation, 57.5%.

J. Howell, Jr.

JUNIPERUS MONOSPERMA
(One-Seed Juniper)

TOTAL VOLUME OF BRUSH IN CUBIC FEET BASED ON
CROWN WIDTH IN FEET AND CROWN LENGTH IN FEET

Arizona - New Mexico
1939

Total Volume
of Brush

